

Memorandum

Date: May 20, 2021

To: Matthew J. Ohl (United States Environmental Protection Agency)

From: Gary Wealthall and Julie Konzuk, Geosyntec Consultants

Copies to: Norman Bernstein, Peter Racher, Thomas Krueger, Douglas Petroff,
Mark Nichter, William Clabaugh, Corey Knox, David Becker, Jason Miller,
Andrew Gremos

Subject: Response to EPA Comments on the Data Summary
Stage 1: Sump Cleanout Memorandum from the
Third Site DNAPL Cell Post-Thermal Remediation Approach

Comments on the Data Summary, Stage 1: Sump Cleanout Memorandum (issued March 30, 2021) were received from the Environmental Protection Agency (EPA) on April 22, 2020. This memorandum provides a response to the EPA comments. Accompanying this memorandum is an updated Data Summary, Stage 1: Sump Cleanout Memorandum (Revision 1) that incorporates the additional feedback received by EPA. The table below provides a summary of the received comments, the relevant section in the report, and our response. The text has been formatted as follows: ***Bold italic*** is new or modified text proposed for the final document.

Comment Number	Section, Page or Figure	EPA Comment	Response
1)	Page 2 & TABLE 2	Note on Table 2 the referenced 2/1/2021 groundwater samples were collected “just above the level of the sediment at the base of the wells using a pump lowered to the bottom of each well (as specified on Page 2). Also add that well purging and/or development did not occur prior to groundwater sample collection. If well purging and/or development did occur prior to sampling, then indicate this in the written memorandum on Page 2 under “APPROACH.”	<p>Page 2, “APPROACH”, paragraph 1, second sentence has been modified as follows:</p> <p>“A groundwater sample with some suspended sediment was collected by Ramboll <i>prior to well development</i> just above the level of the sediment at the base of the wells using a pump lowered to the bottom of each well. <i>Well purging did not occur prior to groundwater sample collection.</i>”</p> <p>The following has been added to Table 2 in the Notes section:</p> <ol style="list-style-type: none"> 1. Groundwater samples were collected just above the level of the sediment at the base of the wells using a pump lowered to the bottom of each well 2. Well purging and/or development did not occur prior to groundwater sample collection.

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2)	Page 2 “Approach”	For clarification purposes, indicate whether the groundwater samples collected were filtered or unfiltered during collection.	Page 2, “APPROACH”, paragraph 1 has been modified as follows: “...A groundwater sample with some suspended sediment was collected by Ramboll <i>prior to well development</i> just above the level of the sediment at the base of the wells using a pump lowered to the bottom of each well. <i>Well purging did not occur prior to groundwater sample collection. Groundwater samples collected prior to the sump cleaning were not field filtered.</i> ”
3)	Page 2 “Approach”	Expand on why a sediment sample was not collected from each well for characterization purposes. Actual sediment characterization activities were not specified in the work plan.	As per footnote #2, page 2 of the letter: In the email dated January 19, 2021, USEPA had requested that “the material” in the sumps be characterized for VOCs, pH, temperature, and ORP. Because of the method of well development that was used (i.e., vacuum extraction combined with water jetting), it was not possible to collect a sample of undisturbed sediment. Collection of the groundwater sample as close to the bottom of the well as possible <i>and without purging the well or field-filtering the sample</i> was undertaken with the hopes of capturing some of the sediment as well. (Note: <i>bold italics</i> text was added to the footnote for added clarity)

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4)	Page 3, FINDINGS & TABLE 2	The third paragraph references contaminant concentrations that were detected at sample location “P-1” during an April 2020 sampling event. For comparison purposes and ease of use, add the reported April 2020 concentration results to Table 2.	The April 2020 concentration results have been added to TABLE 2, which is included as an Attachment in this memorandum.
5)	Page 4	The last paragraph references “depth discrete plots of soil concentrations at PSGS-3 and PSGS-4 (located in close proximity to P-1) provided in Geosyntec (2021b).” For ease of use and to support the conclusions, add the reported depth discrete soil plots as an appendix or attachment to this memorandum.	The Soil and Groundwater Data Plots have been included as Attachment B to the memorandum. Page 4, last sentence has been modified as follows: “As seen on the depth discrete plots of soil concentrations at PSGS-3 and PSGS-4 (located in close proximity to P-1) provided in Geosyntec (2021b) and included in Attachment B , elevated concentrations of TCE and 1,2-DCB were observed in the upper portion of the Lower Till (in and around 33 ft bgs), which is the more likely source for the elevated concentrations in the deeper of the two groundwater samples collected in P-1 in April 2020.”

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6)	Page 3 “Findings”	Expand more on the consequences of the DNAPL reaching deeper portions of the Lower Till unit.	<p>As discussed in our <i>Response to Comments on the McMillan McGee’s Comments on the DNAPL Cell Supplemental Sampling Report</i> (memo from Geosyntec dated December 7, 2020), mobilization of DNAPL beneath the ERH target treatment zone prior to the DNAPL Cell achieving target temperatures would have prevented volatilization of the mobilized DNAPL and effective mass recovery with the vapor extraction system. We have added the following text to the end of paragraph 2 on Page 3 “FINDINGS”:</p> <p>“If the construction of these wells is typical, then the sand pack of one or more of the X-D# and P-# wells could have provided a direct pathway for DNAPL to migrate into the deeper portions of the Lower Till unit <i>to a depth ranging between 43 to 44 ft bgs during the early heating phases when volatilization was not occurring. Once in the Lower Till below the ERH target treatment zone, heating was not sufficient to volatilize the DNAPL and vacuum extraction was ineffective, resulting in an inability for the ERH system to treat the DNAPL that had mobilized beneath the target treatment zone.</i>”</p>

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7)	TABLE 2 & LABORATORY REPORT	<p>It is interesting to note that several BTEX constituents were reported in the groundwater sample collected from P-1, but not in the other samples. This further supports the lack of communication (porosity and permeability) within and between the unconsolidated sediments inside the DNAPL Containment Area. Explain how the proposed post-thermal injection program is supposed to effectively remediate the DNAPL Area without purposely inducing fractures throughout the area to promote distribution of the amendment.</p>	<p>The BTEX compounds detected in P-1 are also detected in XD-3 and X-D4 but at much lower concentrations. However, the concentrations of all compounds in XD-3 and XD-4 were much lower than those in P-1. The ratio of the BTEX compounds to the primary compounds of concern (e.g., cis-1,2 dichloroethene and TCE) are very similar for all the wells, and range between 2% to 5% in February 2021 for all three wells. The higher concentrations of the aromatic compounds observed at P-1 are simply a result of the concentrations at P-1 being generally higher for all the contaminants of concern and thus do not reflect a different source or lack of communication between areas of the DNAPL cell.</p> <p>We further note that there is a significant risk when inducing fractures in low permeability materials of creating additional and unknown contaminant migration pathways which could potentially promote additional spreading of the contamination into previously treated zones. Fracture propagation is very difficult to control, including significant potential for vertical fractures to form creating vertical migration pathways. It is similarly difficult to determine post-fracturing where fracture formation ultimately occurred.</p>

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